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*Dr. J. A. McMillan
From his
Friend
The Author*

AN INQUIRY
INTO THE
NATURE AND BENEFITS
OF AN
AGRICULTURAL SURVEY
OF THE
STATE OF SOUTH-CAROLINA.

BY
JOHN BACHMAN.

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INTRODUCTION.

The writer of this Essay, submits a few words of explanation in regard to the circumstances that induced him to prepare, and finally send it to the press. He has the honor of belonging to a Literary Club, composed of a limited number of gentlemen from the different learned professions, who meet weekly at each others houses in rotation, for the purpose of interchanging sentiments, and promoting sociality. A subject for discussion is selected at one meeting, which forms the topic of conversation on the next. The question for the evening of the 28th December, was "what benefits may be derived from an Agricultural Survey of the State." The leisure of a rainy day had enabled him to collect his thoughts on the subject, and in part commit them to paper. The Essay was therefore prepared and read without the remotest idea of publication. At a subsequent meeting the Club, under an impression that it might afford some information on a subject which had so recently been agitated at Columbia, requested its publication, and that a copy be sent to the Governor, and to each member of the two Houses of the Legislature. He has yielded his assent in deference to the wishes of his literary associates, and especially to the solicitations and liberality of his friends, the Hon. D. E. HUGER, and the Hon. MITCHEL KING.

NOTES

The first part of the paper is devoted to a discussion of the general principles of the theory of the structure of the atom. It is shown that the structure of the atom is determined by the laws of quantum mechanics, and that the laws of quantum mechanics are determined by the laws of the theory of the structure of the atom. This is a circular argument, but it is the only way to proceed. The second part of the paper is devoted to a discussion of the general principles of the theory of the structure of the atom. It is shown that the structure of the atom is determined by the laws of quantum mechanics, and that the laws of quantum mechanics are determined by the laws of the theory of the structure of the atom. This is a circular argument, but it is the only way to proceed. The third part of the paper is devoted to a discussion of the general principles of the theory of the structure of the atom. It is shown that the structure of the atom is determined by the laws of quantum mechanics, and that the laws of quantum mechanics are determined by the laws of the theory of the structure of the atom. This is a circular argument, but it is the only way to proceed.

AN INQUIRY, &c.

THE Legislature of our State has recently made an appropriation for an Agricultural Survey, and the question is naturally suggested what benefits are likely to result from this liberality of our State in fostering our Agricultural interests.

Within the last few years surveys have either been made, or are in a state of preparation in no less than twenty States, and some of the Territories. Some are on a limited scale, and are only confined to Agriculture, whilst others are more extensive. Some States include Geology and Mineralogy in their Agricultural Surveys—some, in addition to the above, have appointed naturalists of known talents to give descriptions of every native production of the State in every branch of Zoology, whilst one State, that of New-York, has ordered not only detailed descriptions, but expensive engravings.

It would be well in the introduction of this subject, to consider not only the relative terms, but the object of these surveys. Geology, in a strict sense of the word, is the science which illustrates the structure, relative position, and mode of formation, of the different organic, metallic, mineral, and other substances, that compose the crust of the earth. Without touching on that branch of the subject which relates to the various theories of the earth, which have in many instances given rise to a tissue of extravagant notions—the Legislatures of our different States seem to have wisely directed the researches of their scientific men to an examination of those products of nature which are within the reach of our observation, and may be applied to practical purposes, being more intent on collecting valuable information, than in an indulgence of speculations, or the invention of theories. As yet we know but little in regard to the means which nature employs to form the very soil on which we tread, by converting into mould

the various animal and vegetable exuviae. We are just beginning to learn how scanty are the genuine observations we possess on the process of alluvial deposits, or on the depositions at the foot of mountains by means of the decomposition of the various rocks. We know but little of the process in producing petrefactions; and the world has only just commenced to apply to agricultural purposes the various mineral, as well as vegetable repositories.

An Agricultural Survey comprehends an examination of the various soils, so as to enable the cultivator to ascertain what plants are best suited to each plantation or district—what ingredients are wanting in the soil to render it productive, and to offer suggestions for its improvement. This requires the skill and the practice of an able chemist, possessing also an acquaintance with the laws of vegetable physiology, and a fund of practical agricultural knowledge.

It embraces an examination of the various localities where manures may be obtained, together with directions for their judicious application. It points out the errors in the mode of cultivation, and suggests such new improvements as have undergone the test of experiment. It is intended to direct the planter to such new objects of culture as may be safely introduced, when others have been found unprofitable—it extends to agricultural statistics, and to the management of animals in domestic use—in a word, it includes every department of agriculture.

A knowledge of several branches of Natural History, is more or less intimately connected with agricultural improvements. The localities of plants indicate peculiar soils—the ranges of quadrupeds, and the migration of birds, afford us lessons in regard to temperature, nearly equal to those of the thermometer, and the study of the habits of insects, which are either a pest, or a blessing to the farmer, is of very great importance.

In some of the districts in several of the States, great benefits have accrued from these Geological and Agricultural Surveys. In a few instances new localities of metallic deposits have been found, whilst in others various mineral manures, limestone, gypsum, marl, &c., have been detected, which have converted whole districts into fertility. In addition to these, other discoveries have been made—such as valuable clays, building stones, marble, materials

for cements and localities, where by boring, springs of wholesome water have been conducted to the surface. On the whole, however, I am inclined to think that the mass of the community in the greater number of the States, has been somewhat disappointed in the results of these Geological, Agricultural and Zoological Surveys. Too much no doubt was anticipated—men hoped that veins of gold would be found running under the surface of their farms, and that the quantity of silver which should be detected among the rocks, would facilitate the great desideratum in our country—a specie currency. The farmer expected to be taught by the chemist how to double the product of his fields, without any additional labor. These results did not generally follow, and men had no right to anticipate them. There can be no doubt, likewise, that in an undertaking so new to our country, some mistakes have been made in the selection of the individuals, who carried on these surveys. Some of them having been incompetent to the task assigned them, and others having performed it carelessly, and more from a desire of obtaining the pecuniary appropriations of the State, than that of adding to its resources, or of advancing their reputations among men of science. The reports on the surveys of the different States, are now slowly and irregularly coming before the public. In general, they are characterised by those defects, which are incident to a new and difficult undertaking. Whilst some are very creditable to their authors, others afford abundant proofs of carelessness, haste, and a want of knowledge.

In the State of Massachusetts, not only an Agricultural, but a Geological and Zoological Survey, was ordered. The report on Agriculture, by the Rev. Mr. Coleman, is of very high merit. In the Zoological department, some information is given by Harris on Insects, that may be beneficial to agriculture, and some additions made to Ichthyology by Dr. Storer, that may aid the cause of natural science; on the whole, however, the papers on Zoology betray evidences of imperfection and haste. Still, as some of these branches are but distantly connected with agriculture, and the works have been got up without much expense to the State, if they confer no extensive benefits on science, they can do it no harm. In the State of New-York, however, the Legislature proceeded on a more magnificent and expensive scale.—

In 1836, an act was passed, which was amended in 1840 and '42, ordering a survey of the State. Various distinguished individuals were appointed to give detailed descriptions of all the natural productions of the State, in the departments of Zoology, Botany, Mineralogy, Geology and Palæontology. These were to be accompanied with expensive engravings. To what number of volumes the result of these labors will be swelled, we are not yet informed, or what will be the expense when completed, it is difficult to conjecture,—only one volume having as yet appeared. In 1842, however, the State had already appropriated \$120,000 to this object. There appears on the whole, to have been a State pride in this lavish expenditure, not very creditable to the wisdom of the Legislators of the Empire State, which may eventually produce a reaction, and finally, occasion more injury than benefit, both to the cause of science and agriculture. It may reasonably be asked, what benefit can be conferred on a State, by a publication of descriptions of well known Birds and Quadrupeds, not a single species being peculiar to the State, whilst the great majority have a range of several thousand miles, especially when they are well described and better figured by others, and when no new information can be imparted, and no evidence can be exhibited of any improvements in art. I am not aware, that in the most important branch,—an Agricultural Survey, any thing was ordered to be done at the expense of the State, and no examination was instituted of the Insects, that are either a blessing or an injury to the farmer. An examination of the minerals and organic remains was important, as the various localities of the State, had not before been scientifically, explored, and although no new discoveries of coal and other objects of anticipated wealth were made, it was well to ascertain that none existed. A simple list of the plants and their localities, and of the Mammalia and Birds of the State, indicating those which were resident or migratory, injurious or serviceable to the husbandman, with reference for descriptions to standard works, seems to be all that the wants of the State and science required. I allude to these facts, in order that our own Legislators, in the important work we have undertaken, may be guarded against lavish expenditures on secondary objects.

I come now to notice the recent appropriation by our Legislature, for the survey of our State. In the present case, it cannot be

said that the State has been hurried into the measure, as it has been proposed, I think, by every Governor, and agitated in both Houses of the Legislature for the last five years. The appropriation also involves but a moderate share of expense, and is limited to a single object—an Agricultural Survey.

There can be no person of education and practical knowledge, who has had an opportunity of witnessing the improvements in agriculture, in Europe and our Northern States, who must not be decidedly favorable to the introduction of science into our system of agriculture, nor have we any room to doubt, that when this is fully understood, and carried into practical effect in our State, the product of our soil will be vastly increased—our country will be rendered more healthy, and our improvements in agriculture will advance manufactures and the mechanic arts; the number of inhabitants will be greatly multiplied, and a greater degree of intelligence as well as prosperity will be the inevitable consequence.

In England, Belgium, and some parts of France and Germany, agriculture is now pursued on scientific principles; and the preparatory study for the occupation of a successful farmer is the work of years. There are, however, advantages in all those countries possessed by the cultivators of the soil, that enable them to introduce science into their modes of cultivation, which are not enjoyed by the farmers of our Northern States, and only in a limited degree by our planters of the South. The European farmers, are either wealthy land owners, or rent large and extensive tracts of land, amounting in most cases to many hundred, and frequently to several thousand acres. The peasantry are in their employ—under their direction, and are obliged to adopt the modes of culture determined on by those who employ them. In the Northern United States, the farms are small compared to our Southern plantations, or to the extensive domains of an English nobleman. Our American farmers not only superintend the concerns of their farms, but generally labor in the fields. Hence every small farm has its own system of agriculture, according to the knowledge or caprice of its owner, and except in a few cases, science has lent but a feeble aid to agriculture. In the Southern States, although our plantations are much larger, and our operatives under the control of the master, yet we labor under many disadvantages,

owing to our climate, and more especially to our great deficiency in agricultural knowledge. Whereas, in the European kingdoms, I have mentioned, the soils of each district, and frequently of each farm, have been thoroughly analyzed—and the intelligent farmer is fully acquainted with the kind of cultivation best adapted to his lands. He has been taught, by a system of under-draining how to diminish a redundancy of moisture; and by irrigation, how to render an arid soil fertile. Science teaches him how to apply manures to correct a superabundance of clay—how to use the various formations of lime, and when and where to withhold them; and he is guided by the lights of science and experience, in the selection of those manures best adapted to the roots and plants he is desirous of cultivating. For the last half century at least, this system of agriculture, on scientific principles, has been maturing in the minds of the Europeans. Manures have been dug from the bowels of the earth—gathered from the sea, and imported by ship-loads from the battle-fields, and other depositories contained in foreign lands. The Physiology of plants has been carefully studied, and every year is adding to their knowledge in this important branch. An acquaintance with the laws of Chemistry has become more general. Botany is no longer regarded as a merely amusing, but a practical and beneficial science. Their knowledge of Ornithology teaches them to know what birds should be preserved to aid them in diminishing the number of depredating insects; and Entomology, one of the most important, but most neglected branches of science, has been so far studied, as to enable them to guard, in a great measure, against the depredation of insects which infest their grains, fruits and trees. In these various departments, the conquests of science have been such, that the cultivation of the soil on scientific principles, and the study of natural science, as a part of the system, is no longer viewed as a doubtful experiment; on the contrary he who rejects these lights of science, is regarded by the most intelligent, and most successful cultivators of the soil, as half a century behind the knowledge of his fellow men in this age of improvement.

In our own country, few farmers have adopted those modes of culture, which the experience and science of Europeans have discovered to be most productive, and the planters of the South are

in this particular behind the farmers of the North. Cotton and rice, the rich staples of our State, have so far banished other cultures, that we have now to import the corn we use in Charleston from North-Carolina, Maryland, and Virginia—our flour from the Middle States—our hay from New-York and New-England—our butter, cheese, and Irish potatoes, from the same prolific source; and our horses, beeves, and hogs, from Kentucky and Tennessee.

Hundreds of thousands of acres of our former inland rice-fields, are now wholly abandoned, and have become the habitation of the frog and the alligator. The soil in many of our districts has been exhausted by bad cultivation—as is the case in some parts of St. Paul's, St. Andrew's, Christ Church, and other parishes. Many of their former inhabitants have gone to Alabama and the West, where by a similar system, they have in many cases been equally unsuccessful, and some of them, or their sons, have, after years of absence and deprivation, returned to become overseers over the lands they once owned; like Ruth, to take the gleanings of fields once their own; may they prove as fortunate and as deserving. Our mountains abound with metallic wealth, but, until recently, the iron of the plough-share that turned up the soil, resting on beds of the finest iron ore in the world, was imported from the North, and the iron bars of our Rail-Road came from Liverpool. Marl exists in hundreds of localities in our lower country; and lime-stone in our mountains, and even in our middle districts, sufficient to enrich the soil to the end of time—our rivers and our sea-shore abound with ingredients of inestimable value to the planter, but we have not availed ourselves of these rich manures which nature has so bountifully provided. The Hessian fly and the chinch-bug destroy our wheat—the weevil our corn and rice—the army worm, the rot and the rust, our cotton—the sawyer our pines, and the curculio, the coccus and aphid, our fruits—so that we lose one half of the products of our fields, gardens and forests; and yet there is scarcely a man in our Southern States that is acquainted with the habits and character of a single one of the species of these depredators; and of course till its habits and modes of propagation are known, it will be impossible to suggest an antidote.

From this admitted defect in our knowledge of agriculture, the important question arises, how can the evil in question be best re-

medied, and in what way may an Agricultural Survey be rendered beneficial, under present circumstances ? No one acquainted with the subject, can deny the benefits which would result from a survey, conducted on scientific principles, provided it can be rendered available to practical utility.

There are, however, immense difficulties in the way of success ; these should be candidly stated, in order that they may be met and overcome. If the survey is to be conducted on purely scientific principles, founded on a careful analysis of soils, and a thorough knowledge of vegetable physiology, it is to be feared, that the individual suitably qualified to perform this complicated and arduous task, cannot be found in the country—and even should we be successful in obtaining such a person, the agricultural knowledge in the community, is not sufficiently advanced to enable our cultivators to be acquainted with the mode of applying the results to practical purposes. Besides, if the whole work is left to a single individual, unaided by Agricultural Societies, and men of science, he would not be able to survey the whole State, during the term of a long life. The survey of a single county of England required, in some instances, four years, aided by Agricultural Societies, as well as the intelligence, advice, and personal aid of nearly every landholder in the county. Different individuals employed in these surveys, arrived at different chemical results. Errors were corrected but slowly—new tests were resorted to—new surveys made, and the subjects were discussed from week to week, for a succession of years. There is another subject which we ought not to overlook. The chemical analysis of the soil is one thing—the application of the knowledge thus derived, to the plain purposes of agriculture, is another. The chemist may be correct in his statements of the various ingredients in the soil submitted to his examination ; but he must be either acquainted, with the practical operations of these results to the purposes of agriculture, or the agriculturists to which he submits them, must have sufficient knowledge of chemistry and vegetable physiology, to carry them into successful operation. Let us take for instance, the able scientific analysis of the soils made by Professor Shepard, from eight localities of a plantation on Edisto Island, and let us inquire how many planters can be found in South-Carolina, who have a

sufficient knowledge of agricultural chemistry, to be guided by that analysis, in ascertaining what ingredients are wanting to render these soils more fertile, or what causes have been operating in producing sterility? Even the admirable report which accompanies it, (see Southern Cabinet, 1840, p. 449,) drawn up with great care and research, by a committee of intelligent practical planters, although it contains much valuable information in regard to various manures, does not afford us those plain and practical instructions, which the unskilled planter is so desirous of possessing.

The difficulties moreover, which attend the process in making such an analysis of the soil, as will be available to practical purposes, are greater than the practised chemist is willing to admit. Sir Humphrey Davy believed that "neither much time, or a minute knowledge of general chemistry, were necessary for pursuing experiments on the nature of soils and properties of manures." To him, who was thoroughly acquainted with the subject, the work was simple enough; but to men who know nothing, even of the first principles of the science, there are difficulties which are for a long time insuperable. Even Davy, Lavosier, Chaptal, Decandole, Liebig, Dana, Coleman and Jackson, the lights of the world in the science of agricultural chemistry, have often differed, not only in regard to their experiments, but in their practical application. It is to be greatly feared, that our planters have not received that preparatory education, which would enable them to derive immediate benefit from a purely scientific survey. In England, Agricultural Societies and agricultural education preceded these surveys by half a century. This was in a great measure the case in the Northern States of our own country. It has been observed, that when this deficiency existed among the people, they derived no immediate benefits from these lights of science; but in those counties, where men had been long trained in these preparatory schools of agriculture, they immediately profited by those aids which science presented. It is to be feared, moreover, that sectional jealousies and dissatisfaction may arise, from the fact, that the agricultural Surveyor does not possess the power of ubiquity, and is obliged to confine himself, for a considerable time, to one portion of the State, in order to render his labors of any value.— In this stage of our progress, should the overwrought anticipations

in regard to the great advantages of such a survey result in disappointment, a reaction might be produced and cause a delay beyond the proper time; for although such a scientific survey of the State, may perhaps, at present, be rather premature, yet it would in a few years hence, when the public mind has become sufficiently enlightened, be productive of immense advantage.

Fortunately these difficulties, which are here presented, in order that they may be guarded against, are not insuperable.

Much will depend, on the individual to whom this important work shall be entrusted. In his selection, all party feeling and personal attachments should be disregarded. He should not only be a man of science, but of practical experience in agriculture. He should be satisfied with our peculiar institutions, and have some knowledge of the culture of the staple articles of our State, as well as of those productions which are essential to our food, and furnish pastures for our cattle. He must be a man of an enlarged mind, and if possible, free from those strong prejudices which so often prove a barrier to the reception of truth. I have often met with managers of large estates of cotton or rice, who had been eminently successful in a mode of culture adapted to a particular region, and a particular plant—so wedded to the mode of cultivation they had adopted, that no arguments could convince them that a different plant—another locality and soil, required a very different treatment. An agricultural Surveyor should know enough of chemistry to enable him to analyze the soils—and be able to detect deposits of marl, limestone, and those other ingredients, which should be used as manures. In the present limited state of our agricultural knowledge, I would prefer a highly intelligent practical man to a purely scientific one, who is unskilled in the practical application of the laws of agricultural chemistry. He must, moreover, be a man of labor and patience, for he will have to experience some deprivations, and encounter a host of difficulties. Such an individual might gradually prepare the way for a more thorough and scientific survey of the State. He might encourage, and give a proper direction to the labours of our agricultural societies, and call forth latent talents in every part of the State. Some such unpretending practical examinations should be made of the agriculture of our various districts, as we have seen

from time to time in the labors of Ruffin and Legare. The time may not yet have arrived, when we can be much benefited by such surveys as were made by Coleman, of Massachusetts, and Jackson, of New-Hampshire and Rhode-Island, unless they are rendered far more plain and practical than those contained in their scientific Reports; but he may prepare the way, and give a new stimulus to agriculture. The result of his labors should be regularly published in so cheap a form, that they may find their way to every family in the State.

Much reliance must also be had on the public, in aid of this important undertaking. Men must not expect too much, or become impatient. A work has been commenced, which, to prove beneficial, must be continued for years. Sectional jealousies must be avoided, and we must regard ourselves as belonging to Carolina, rather than to one of its parishes. The minds of our planters must be more directed to those agricultural studies on which their prosperity so much depends, and being now about to engage a teacher, they must become industrious scholars.

I will now proceed to offer a few suggestions in regard to some of the means of instruction of which we might avail ourselves, in order that an improvement in our agriculture may be effected. These indeed should have preceded this survey by many years, if it is to be conducted on really scientific principles, or may now be rendered important auxiliaries, if it is intended to be merely an examination of the products of, and modes of culture in the different districts of the State.

1. I would suggest the establishment of Agricultural Societies in every district of our State, the fee of admission to membership should be so low, that not only planters, but overseers, and men in every walk and occupation of life, may be encouraged and induced to become members. These Societies should be active, and hold their meetings not once a year at a club-house, to eat a dinner and talk politics, but monthly or weekly, and interchange sentiments on the results of their several modes of agriculture. There will always be in every association of this kind a few men of education, who read the agricultural publications of the day, and who are possessed of sufficient zeal and industry, to submit to the test of practical experiment the information imparted by agricultural jour-

nals. If am asked, whether in order to carry on the process of cultivating the earth on the principles of science, I regard it as necessary that every planter should be a chemist and physiologist, and be at the same time acquainted with those branches of natural history, Botany, Entomology, &c. which are so closely connected with it, in a word, whether every culturist must be a man of learning, and of science, I answer—unhesitatingly, No. As in government, a few leading men give a tone to the politics of a State—so in agriculture, the science and practical success of a few prominent planters in the State, will be a perpetual practical lesson to the districts around them, and men will adopt their practice without knowing much of the principles of science by which they have been governed. Man is an imitative animal, and is not slow in adopting the improvements of his neighbors, where he sees how much his own interest is concerned. When the celebrated Arthur Young, in 1767, commenced his valuable and well directed labors, and pointed out to his countrymen an improved mode of husbandry, they adopted his mode of culture although they only looked at the effects, and were unacquainted with the scientific views which had governed him in carrying on his successful experiments. It has been ascertained, that in those counties of England, where Agricultural Societies were first established, the products of the earth have been trebled within the last thirty years. The Highland Society, which has existed for sixty-four years—the most prominent, active, and most efficient in the world, whose meetings are held at Edinburgh—has, by the stimulus it gave to industry on the principles of science, rendered a once barren soil, in an inhospitable climate, equal in many of its counties, to the best portions of England itself. The Lothians are covered with the most luxuriant crops of wheat, barley, beans and other products. On the meadows, the most valuable grasses are cultivated; the mountains, even to their very summits, are covered with rich pastures, and I observed herds of cattle and sheep grazing on the very top of Ben-Lomond, and other high peaks of that romantic land. All this I contend has been effected by a practical application of scientific knowledge, diffused by means of an Agricultural Society.

A fact or two in elucidation will be mentioned. Surveys were made in each county of Scotland, as well as of England—the soils

were analyzed—the materials in each vicinity for manuring were examined, and a printed and detailed account was placed into the hands of every landholder, which would serve as a guide in the management of his farm. It is, moreover, not generally known that Scotland furnishes more than a fourth of Europe, and a portion of America, with genuine undegenerated seeds of many of the grains, melons, garden and flowering plants, that are usually cultivated. How is this effected? Botanists have discovered that a superior variety of seed immediately degenerates on being planted near those of other species or varieties of its own, or a kindred genus, and that on the second, or at farthest, the third year, the original and valuable character of the plant has, in a great measure, disappeared. Hence it is that in Carolina, when we plant our imported cantelope melon seeds, in the vicinity of our common melons, squashes, &c., all their original, valuable properties disappear on the second year; so also, our cauliflower, becomes a mongrel cabbage, as I have ascertained; and I am inclined also to think, that the generally received opinion in Carolina, that all Indian corn, when planted near our sea-board, whatever may have been the original variety, is converted into what is called flint corn, by the peculiar character of our soil and climate, may be erroneous; and that this peculiarity may be traced to the near approximation of our abundantly prevailing fields of flint corn, communicating their farina to the small patches of new varieties of corn, on which these experiments are making. But how is this evil remedied in Scotland, and why are the seeds of their grains and vegetables preserved without the slightest degeneracy from age to age? In raising seeds for planting, or exportation, no two varieties of the same species, or even genus, are suffered to grow within miles of each other, lest the winds might waft the fructifying farina of another plant, and produce degeneracy in any approved variety.

Some of the benefits then, which we would have every reason to anticipate from well conducted Agricultural Societies, would be the following :—

1. Such Societies would bring to a closer intercourse a few educated and scientific men, and a vast number of industrious practical agriculturists, who, by an interchange of their different modes of

culture, would be equally benefited by the details of failures, as well as of successful experiments.

2. They would not long exist, before the members would be made sensible of the importance of analyzing the soils of their several districts, and thus ascertaining, whether there is a deficiency of those ingredients, which are necessary to the nourishment of the plants cultivated—what manures should be applied, and what modes of culture should be pursued.

3. They would be able to ascertain the causes which have converted the once fertile plantations of Carolina into old fields, grown up with broom-grass, and no longer yielding sustenance to man or beast;—they would learn the importance of a rotation of crops, as it is now well ascertained, that different plants not only feed on different substances contained in the soil, but that there are peculiar exuviae from each, which would be injurious, were the same plant reared on the soil for a succession of years, but would be a source of nourishment to plants of a different genus.

4. They would be able by this increased intercourse and knowledge of culture, not only to augment the quantity of the staples now in cultivation, but introduce other valuable products, to which our soil and climate are well adapted.

5. They could scarcely fail to direct their attention to the introduction of some of those grasses, which would answer as substitutes for the herd's-grass and clover of the North, which do not succeed in our Southern climate, except in particular soils and situations. The introduction into Carolina of a perennial grass, suited to pasturage and hay, would confer a greater benefit on the State, than the discovery of the richest gold mine.

6. By this additional stimulus to industry, and by the better draining and cultivation of our land, not only the wealth, but the health of the country would be improved. I could not fail to be forcibly struck with a remark made by Liebig in his *Agricultural Chemistry*, although I am aware that physicians have adopted contrary opinions in regard to this theory: "Plants (says he) improve the air by the removal of carbonic acid, and by the renewal of oxygen, which is immediately applied to the use of man and animals. Vegetable culture heightens the healthy state of a country, and a previously healthy country would be rendered quite uninhabitable

by the cessation of all cultivation." The truth of Liebig's remark is verified by the increased unhealthiness of our Southern country, since our own water-courses have been obstructed by decayed vegetable matter, and our fields suffered to remain uncultivated. Sixty years ago, the planters did not find it necessary to remove from their plantations on account of any apprehensions from fever, and many of our oldest inhabitants still living, were born and reared in situations, where there would now be imminent danger in remaining only a single night, during summer; and the question is of momentous importance, what process would render our climate of Carolina more healthy than it is at present. We may learn something on this head by looking at the effects of cultivation in other countries. The boggy fens of England were once the fruitful sources of fever. They have been drained—the peat moss has been converted into fuel—the lands are cultivated in grain—the peasant's cottage now stands on its borders, and he enjoys uninterrupted health. The time was, when the pontine marshes were traversed, even in the day time, at the risk of life; we are informed, that those portions which are drained, embanked and cultivated, are now comparatively healthy. The low grounds of Holland and Belgium, were once as sickly as Carolina is at present; in the autumn, 1838, I slept several nights in their vicinity, and I was informed, that since they cultivated their grounds more carefully, their former fevers had disappeared. The sluggish waters were still in their dykes, but decayed vegetation was no longer steeped in them—every foot of land was cultivated—the borders of their ditches were planted with nursling trees, which were to become the future pride of their forests; and the cabbage and cauliflower plants, along the public highway, nearly touched the wheels of our carriage. Thus, the plants inhaled the unhealthy carbonic acid gas, renewed the oxygen, and the improvements in agriculture, rendered countries healthy, that had formerly been very sickly.

The II. Auxiliary to our improvements in agriculture, I would suggest, is *cheap* and widely circulated *Agricultural Papers*.—This is a subject so self-evident, that it is unnecessary to offer any remarks on its importance. Agricultural Societies, without a publication of their transactions, would be as inefficient as a rail-road without a locomotive.

21 III. I would above all, recommend a *School*, where those branches are especially taught, which appertain to Agricultural and Horticultural pursuits. Schools of this class, first had their origin, I think, in Germany; they were next introduced into France and Switzerland, and are now springing up in every part of Europe.—The Rensselaer School near Albany, in New-York, is also an agricultural one. The most complete Institution of this kind, I had an opportunity of examining, is called the Institute of Agriculture and Forestry, at Hohenheim near Stutgard. I observe that it is characterised in the British Farmer's Magazine, as "the most complete Agricultural School in Europe." Here, in addition to all the studies usually pursued in academies, all the operations of agriculture and horticulture, are performed by the Students in the open air, under the supervision of Teachers, qualified to undertake, note down, and record every observable fact, and traceable cause. Here, are delivered regular courses of lectures on Geology—Mineralogy and Chemistry—on soils, water, moisture, vapour, fermentation, gases, their extraction, mutual attraction, condensation and results. Instructions are given, and elucidated by experiments, on light, heat, electricity, galvanism, magnetism, &c.—These are all employed by Nature, and are in incessant operation. They constitute the class of great natural agents. Botany, in the most comprehensive sense of the term, forms a very important feature, which extends to the physiology of plants, their uses—medical and other virtues. Entomology is also taught as a science, connected with agriculture; and the habits of Insects, as well as Birds and Quadrupeds, are studied, in order to guard against their depredations, or be benefited by their labors.

The establishment of an *Agricultural School* on a model, of which the above is a faint outline, which may be modified in some particulars to adapt itself to the wants of our country, I most certainly believe, to be of greater importance to our agricultural interests than even an Agricultural and Geological Survey—than Agricultural Societies, or Agricultural Papers, inasmuch, as such a school would inevitably lead the way to all these other aids to our knowledge and success.

I will not venture on the details necessary to the establishment, support and successful operation of such a school. I will leave to

politicians the settlement of the disputed point, whether the State has, or has not, the constitutional right to expend some of its funds in promoting our agricultural interests, as well as the aids it now affords to our College and our Military School. Suitable Professors may be obtained, although perhaps at present with some difficulty. The expenses would be less than those of a Military School. If the State cannot be induced to lend its aid in such an undertaking, it may be worthy of inquiry, whether united individual effort might not be made available. In a short time the School, under judicious management, would support itself. The term for those who had previously received a good English education should be about two, at farthest, three years. Our planters, I should suppose, would prefer having their sons educated in such a seminary, after suitable instructions in some of our grammar Schools, to that of sending them to our Northern Colleges, or even to West Point. However highly I estimate the value of the higher branches of mathematics, and the modern languages taught in the latter, I cannot conceive that even such a School will confer half the benefit on our country, as would inevitably be derived from a well regulated Agricultural School on the principles of science. Fifty young men thus educated, would disseminate a knowledge of the science of agriculture, which would give a stimulus, and serve as guides to the whole State.

I am fully aware of the objections which many successful planters urge against the scientific cultivator. He is regarded as a theorist and a speculator, and it is predicted that he will eventually be unsuccessful. It is admitted that a man may have very correct ideas of agriculture, and yet, if he does not carry his knowledge into practice by constant attention to his planting interests, all his scientific knowledge will be unavailing. On the other hand, he who has become successful as a self-taught planter, might have reached this eminence many years earlier, and promoted his pecuniary interest to a much greater degree, had he possessed the benefit of previous knowledge. All self-taught men who have risen to any high degree of eminence, have subsequently lamented the disadvantages under which they had labored, owing to the want of previous education. What would we think of a lawyer, a physician, a merchant, or a mechanic, who would attempt to exercise his pro-

fession, without having made himself acquainted with any of those previous studies, which the world regards as essential to his success, in the profession he has chosen? At present, our young planters are engaged for years in their professions, before they have learned, even the first principles of agriculture, and they acquire a knowledge of planting, more frequently from their past failures, than by accidental instances of success.

I contend, that nearly every improvement in agriculture, as as well as nearly every discovery of importance to mankind, has been the result, not of the accidental discoveries of the ignorant, but of a previous knowledge of some of the sciences, guiding these gifted and studious men onwards, in their researches after truth. If Newton derived his first idea of gravitation from the fall of an apple, it required such a mind as that of Newton, to make the practical application. The cook has seen the steam, issuing from the spout of the tea-kettle, from early times, but such minds as those of Watt and Fulton, were requisite to apply this knowledge to any available purpose. Every school-boy can fly a kite, but it required the scientific knowledge of a Franklin, to render it the medium of conducting to earth, the disarmed lightnings of heaven. The labors of such men as Sir Humphrey Davy, Arthur Young, Lavosier and Liebig, have done a thousand fold more for the comfort and happiness of Europe, than all the Legislators, that thundered in their Senates, or all the Heroes, whose names are enrolled on the pages of history, and whose monuments fill the niches of Westminster Abbey, or adorn the romantic grounds of Père le Chaise. And when the political excitements in our country shall have happily subsided, such names as those of Judge Buel, Skinner, Ruffin and Seabrook, will be held in grateful remembrance, whilst those of our noisy political patriots, will only be handed down to posterity, through the musty streams of a forgotten newspaper.

I will here enter a little into detail, on the nature of those studies which should be pursued in an Agricultural School, and on their beneficial results.

1. The first and most important is, *Chemistry*—a branch of physical science, which analyzes and investigates the composition of inanimate bodies. This claims our special attention, not only on account of the manner, but the variety of ways by which

it may be applied. Soils, we know, must differ widely in their various component parts, since even, in one part of the same field, the product is double to that of another part. A field may be admirably adapted to one kind of culture, which would produce but a scanty crop of another kind. Now, this deficiency in the latter case, arises from the fact, that the soil is wanting in some element, necessary to the growth of the plant, or possesses some ingredient which is positively injurious. In order to correct this defect in the soil, the culturist must first be convinced, that the evil in question, is occasioned by some deleterious substance, or by the absence of some necessary one. How can he ascertain the fact? Soils are so blended that we cannot be aided in the investigation by the examination of our senses, without chemical tests. Sir Humphry Davy in his *Agricultural Chemistry*, mentions the following fact which is in point:—"A soil of good apparent texture, from Lincolnshire, was put into my hands by Sir Joseph Banks, as remarkable for sterility. On examining it, I found it contained sulphate of the oxide of iron, and I offered the obvious remedy of a top-dressing of lime, which converts the sulphate into a manure." Here was a soil, the causes of whose sterility could not be conjectured, even by so close an observer, as the eminent Naturalist Banks; yet, by the application of chemical tests, the whole mystery was solved, probably in a few moments. It is a well known fact, that whilst the farms on Charleston Neck are admirably adapted to the culture of the Irish potatoe, turnips, carrots, and the whole cabbage tribe, they will scarcely produce the sweet potatoe of large size. There must then be, some deficiency in the soil necessary to the production of this vegetable, which a chemical analysis, both of the soil, and the potatoe itself, would no doubt point out. A planter of this vicinity, desirous of improving his lands on which he was planting a crop of corn two years ago, placed in each hill a quantity of fresh bog earth, from an adjoining old and abandoned rice-field. This was immediately covered in with the grains of corn. It produced scarcely seven bushels to the acre, and he came to the conclusion that swamp mud was rather an injury, than a benefit to the corn. He was unacquainted with chemistry, and had no great regard for the opinions of scientific men as guides to agriculture. It was suggested to him that he had applied to his plants, that which in

its then state was poisonous, and was advised to open the hills—to expose the still undecayed mass of swamp mud to the operation of air, light and atmospheric electricity, and replant on the following spring in the same hills, and with the same manure, which would then have undergone chemical action, and be in a fit state to afford sustenance to the plants. This, after necessary ploughing, was somewhat reluctantly done. In this second experiment he was more successful, having made thirty bushels to the acre, instead of seven, the product of the former year. Manures which are beneficial to some kinds of land, will be positively injurious to others. Putrescent vegetable matter, salt and various alkalies, are used as manures; and yet, some lands will be benefited by the one, and would be rendered less productive, were the other applied. The same may be said in regard to plants. A familiar instance may be mentioned. The rich soil which would cause the geranium to flourish in our flower-pots, would, were it applied to our japonicas, azelias, and rhododendrons, cause them to deteriorate, and finally to perish. Hence, the importance of chemical, as well as physiological knowledge, in enabling us to analyze the character of our different soils, and ascertaining their adaptation to the various plants and grains we are desirous of cultivating.

2. The next important branches that should be taught in an Agricultural School, are *Geology* and *Mineralogy*. These are so closely connected in many particulars, that they can scarcely be separated, still some are alone applied to the arts, whilst others are more directly beneficial to agriculture. A beneficent providence has scattered mineral and organic wealth, through every portion of the earth. Our mountains abound with it, and on our sea-board there is no deficiency, although it appears in another form. The different minerals can be distinguished from each other, by forms, obvious at once to the senses. The mineralogist, can at a glance, detect the characteristics of each species, and is thus enabled to ascertain, what may be profitable to man, and reject what is of no value.

How much labor is annually bestowed, how much money expended, and how much deception practised on the simple and credulous, which might all be prevented by a knowledge of mineralogy. How many a speculation in a gold mine, which has brought

ruin on the family of the purchaser, might have been avoided, had he possessed this knowledge. I have seen a poor family thrown into extacies, and dreaming for months over their anticipated wealth, because an ignorant pretender, had discovered on their lands, an ore, which he called gold, and pronounced the mine of immense value, but which a mineralogist detected as nothing more than sulphuret of iron. I well recollect the sensation produced among the farmers of New-York, when, in consequence of the last war, they were unable to import from the British province of Nova Scotia, their Gypsum or Plaster of Paris, which was in universal use. The plaster had risen in price, to thirty dollars per ton, and at last could not be procured on any terms. Man is full of expedients, and without the restraining influences of religion is not over honest. A man in the north-western part of the State, (whether the public finally decided him to be a knave, or an ignoramus, I do not recollect) pretended to have discovered a bed of plaster, which he offered for sale at ten dollars per ton. The farmers from Rensselaer, Albany, and adjoining counties, in a circuit of an hundred miles, went in their sleighs to lay in their store of plaster: The article was as hard as granite, and many a mill-stone was broken in the operation of grinding. The following summer it was discovered, that they had spent their money and labor for nought, as the material was of no more benefit to their land, than so much sand. But the same science that detected the deception, discovered also a remedy for these temporary losses and vexatious impositions. A careful examination was made of the surrounding country, and not thirty miles from the above locality, an inexhaustible bed of Gypsum was in reality discovered, which has proved a greater blessing to that part of the State, than a mine of gold. Marl is now universally acknowledged to be of immense value as manure. The maritime districts of our State, abound with it, and it has been discovered in many localities, widely remote from each other. That, scarcely a planter in the State, knows what it is, is sufficiently evident, from the specimens they are constantly sending to Charleston from all quarters, which they either believe, or hope to be marl, but which most generally proves a very different material.

and of no value as a manure. The knowledge, industry, and zeal of Ruffin, in having directed the planters of lower Virginia, to the use of marl, cannot be too highly appreciated—in his scientific researches and judicious instructions, he is rescuing from sterility a soil, which Washington had defended with his sword.—His admirable Essay on Calcareous Manures, should be in the hands of every planter, on our Southern sea-board.

3. *Vegetable Physiology*, is another subject which holds an important rank among the studies, that should be pursued in an agricultural School. This science investigates and explains the structure and vital character of plants. Vegetation is either favorably or injuriously affected by the seasons, the changes of weather—the soil and temperature. The organization differs so widely in the several species, that some will flourish only in an atmosphere, impregnated with salt particles, whilst others inevitably perish, if planted in the same locality. In my garden, a part of which is occasionally overflowed with salt water, the cabbage and cauliflower sustain no injury, but are rather improved by a moderate watering of this nature, whilst on the contrary, the bean, corn, spinage, and several other species, remain diminutive in size, become sickly in growth, and generally perish. In particular regions of our country, certain plants are only found where the clay soils prevail, but can never be detected beyond the line which separates this region from the adjoining sandy and loam formations. Some plants only flourish in limestone regions. The winds, the birds, and the hand of man, scatter the seeds far and wide, but they refuse to vegetate in soils, that are not adapted to their growth.—The *Baccharis*, *Salicornia*, *Salsola*, and several other plants, as well as the interesting foreign shrub, the *Tamarix gallica*, thrive only in the neighborhood of salt-water, and are not found beyond these prescribed limits; yet, let but an atmosphere and a soil be prepared for them, either by nature or art, and they will easily grow and flourish there. Thus, the salt springs of Onondago, are, I think, several hundred miles from the sea, yet I have observed several species of these maritime plants flourishing there, although not a single specimen can be found growing in all the intermediate regions. Plants too, produce varieties, often infinitely more valuable, than the originals from which they sprung, and are so im-

proved by culture, that nearly their whole characters are changed. Still all these changes take place, in accordance with the fixed and invariable laws of nature. The object of the vegetable physiologist is, to investigate these laws, in order that by acting in accordance with them, he may bring the vegetable kingdom under his control, and render it subservient to his use. The experiments of Van Mons on fruit trees—the infinite varieties of Japonica, Dablia and Rose, that have been produced of late years, by peculiar modes of culture, are sufficient evidences of the triumphs of science in this department.

4. The next subject of importance to be taught in an Agricultural School, although not in the regular order of succession, is that of *simple Mathematics*, including Arithmetic, Geometry, Levelling, Surveying, &c. Without a general knowledge of these, the planter will often be at a loss in pursuing chemistry, and other studies, with profit and pleasure. The agriculturist must be a careful calculator. He must be able to ascertain what kinds of produce will be most valuable for him to cultivate, taking into consideration his pecuniary means, his locality, and the peculiar character of his soil. He must be able to keep his accounts correctly. A knowledge of Surveying will often save him from litigation, and the art of Levelling is all-important, in enabling him to act with judgment, and to save expense in digging ditches, or canals. A striking instance of the importance to the planter, of the simple art of Levelling, came under my notice during the last year. A gentleman engaged several Irish laborers to dig a boat canal of two miles in length, at a cost of about two thousand dollars. The tide water was to convey the boats to both ends of the canal. The workmen ridiculed the idea of having a scientific level taken, inasmuch, as by carrying the tide water with them, they would be certain of finding a true water level. The canal is dug; the water overflows its banks at the mouth, but scarcely extends half the distance up the canal, and the evil must now be remedied, either by a lock, or an immense labor in digging down from the summit, which appears to be six or seven feet above the level of the lower part of the canal.

5. Another department in an Agricultural School is *Mechanical Philosophy*. The planter is a man of all kinds of work, and should understand the general principles of every addition, or improve-

ment that is going on under his eye. A knowledge of mechanics will often save him from being imposed on by the workmen he employs, and will enable him to have his house, out-buildings and fences, constructed for comfort, with a due regard to durability, economy and taste. He is constantly using machinery, and various implements of husbandry; these should be so constructed as to produce the greatest effect with the smallest expense of power. New inventions are constantly pouring in upon him, and he should possess sufficient mechanical knowledge, to be able to decide what he ought to appropriate to his use as a beneficial, and what he should reject as worthless. Such are the complicated duties of the planter, that some knowledge of mechanics seems almost indispensably necessary, to enable him to carry on successfully the various operations that pertain to his profession.

6. The *rearing of Animals in domestic use*, should be regarded as a subject of sufficient importance to hold some rank in an institution of this kind. In Europe, much attention is paid to this subject. In this department, Great Britain is far in advance of the world. Their fine breeds of horses,* horned cattle, sheep and swine, have been produced not accidentally, but by a thorough knowledge of the peculiarities of those varieties, from which new and improved breeds were to be produced. In England, they have separate breeds of horses, adopted to the various services required of them; and the strong unwieldy dray horse, the carriage horse, the hunter and racer, may be distinguished at a glance. Those varieties of horned cattle are selected, which are best adapted to the pastures on which they are to feed; thus, in the rich

* The finest collection of horses I ever beheld, was at Regensburg, (Ratisbon,) in Bavaria, in 1838. They were owned by the wealthy and luxurious Prince of Taxus, whose expensive stables were more magnificent than many of the palaces of Europe. They were fitted up with marble troughs, fountains for bathing, with the different names of the animals, their countries and pedigrees, placed in gilt letters on the wall. Each horse had his groom, and they were daily exercised in a magnificent circus. Among these, were not only horses of approved varieties from Mecklenburg, Saxony, Austria, Turkey, and France; but, several of the famed barbs from Arabia, and a number from England. To my eye, which I confess is unskilled in these matters, the English courser appeared not only the most elegant in form, but was admitted by better judges than myself, to be more active and fleet, than those of Arabia itself.

level counties of England, and the Lothians in Scotland, the heavier breeds of cattle and sheep are preferred ; but, in the mountainous regions, breeds inferior in size, but equally profitable, are reared, and the black cattle, and the black faced sheep, from the highlands of Scotland, supply the markets of Edinburgh, where they are regarded as fully equal in flavor with the larger breeds. I need not say how negligent our planters have been in regard to their live-stock of every kind ; cows turned into the woods to feed on Broom-grass, are not likely to contribute much to the dairy, and we need not be surprised if our hospitable planters, who own an hundred head of cattle, sometimes find some difficulty in procuring milk for their coffee. Long legged hogs, which appear to have been selected rather for speed than weight, with long noses to root in the pine lands, require as much corn in the fattening season, as would purchase a much greater quantity of bacon ready cured.

I was highly gratified at Edinburgh, on observing a crowd of intelligent young farmers, listening with intense interest to, and taking notes on the Lectures of Professor Lowe, on the rearing and management of horses, horned cattle, sheep and swine—on the varieties adapted to different localities—their diseases and modes of cure. His Lecture-room was embellished with fine paintings of the various animals that were esteemed for their valuable properties.

Nor should the rearing of Poultry be regarded with indifference by the planter. We frequently hear the remark, "I do not raise poultry, because I do not know the art." This only proves that he has still something to learn, before he has made himself fully acquainted with the duties of his profession.

7. The next study which is very important in an Agricultural School, is *Botany*, in the broad sense of the term, which includes not only the names and systematic arrangement of plants, but their properties and uses. The world is infinitely more indebted to science, for the introduction of those productions, which minister to the comfort, the wealth, and power of man, than men are generally disposed to allow. For the introduction of nearly every grain, vegetable, fruit and flower, that minister to the support, comfort, or pleasure of man, we are indebted first to the Botanist for its introduction, and afterwards to the scientific culturist for its

improvement. The seeds of our valuable plants, were collected by the Botanist often at the risk of life in wild distant regions; wheat, barley, rye, rice, the potatoe, cotton, the ground-nut, &c., are all the productions of distant lands, where the world is in most cases lying in barbarism. But we are as much indebted for the improvemont of plants to the scientific cultivator, as we are to the Botanist that first introduced them. Such have been the improvements in the various varieties of wheat, rye, rice, and barley, that Botanists themselves are now at a loss to designate the original plants from which they sprung. The potatoe, which is now the food of millions, had its origin from a bitter root which grows wild in the mountains of South America, and is not larger than a bean, as I have satisfied myself by examining specimens from Montevideo. It was never used as food in that country, till, by scientific culture in Europe, where varieties were produced from the seed, it had become so improved, that it has now been sent back to its native soil, to prove a blessing to the barbarians, that hitherto were unacquainted with its value. The carrot originated from a wild and poisonous plant growing on the rocky cliffs of England. The acrid and disagreeable *Apium graveolens* has been transformed into delicious celery. The wild cabbage, (*Brassica oleracea*), a plant not weighing half an ounce, has been improved into cabbages, whose leaves alone weigh many pounds, and into the cauliflower the most delicious of vegetables. Our fine Swedish turnips have been produced by improved culture, from the (*Brassica napus*), the common and worthless rape; as has our fine turnip descended from the turnip rape, (*Brassica rapa*), which in its wild state is small, fibrous, bitter, and wholly unfit for use. The same may be said of our fruits. The bitter wild crab of Europe, is the origin of our apples, and the wild pear, which I saw in the forests of Hungary, not larger than a musket ball, and as acrid as the unripe persimon, has, by long and scientific culture, produced our delicious pear.

There is another advantage which the planter would derive from a moderate share of Botanical knowledge. He would not be so frequently imposed on, by having seeds of plants palmed on him, as new species of inestimable value, which would, subsequently, prove some common worthless weed. The cunning Italian has

chuckled over the oft repeated hoax he played on the Americans, who seized with avidity on, and paid an exorbitant price for the seed of the Italian mulberry, labelled *Morus multicaulis*. The famous Florida coffee, was sent to the seed stores in Charleston, as a newly discovered species, that would soon shut up the coffee trade of Havana and Mocha. High prices were paid for the seed; acres were planted by the farmer, and magnificent results were anticipated. A single glance of the Botanist, detected in it a troublesome and worthless weed, (*Cassia occidentalis*), growing in most of our plantations in Carolina, which the hoe of the servant had long been engaged in destroying, but which the simplicity of his master was now requiring him to replant, as infinitely more valuable than cotton or corn. For the want of this Botanical knowledge, ludicrous, and sometimes mortifying mistakes have occurred, where no blame could be attached to the vender of the seeds or plants, but were simply occasioned by an ignorance of Botany in the purchaser. I have seen many American plants that had been ordered from Paris and London, by our florists, with no higher recommendation than the exorbitant prices marked on the Catalogue; and when these plants were received, their new owners were not a little surprised to find that they had imported *Azelias*, *Rhododendrons*, *Lobelias*, *Kalmias*, *Bignonias*, and *Magnolias*, which they could have obtained by cart loads in their own woods. Some fifteen or twenty years ago, my esteemed neighbor, James Nicholson, obtained from Missouri the seed of a grass, on which the wild cattle and buffalo, were said to feed and thrive. He disseminated the seed among his friends, who cultivated it under the name of Lewis and Clarke's grass. Among the rest, I sowed a bed of it in my garden, where I had for many years been making experiments on some European grasses. The plants came to maturity, and I was not a little surprised to find, the far famed Lewis and Clarke's grass, to be an old and well known European species, the meadow soft grass, (*Holcus lanatus*) which I already possessed. The soil in which it was sowed, was not probably suited to its growth, and I finally regarded it as inferior to the blue grass, (*Dactylus glomerata*), to which I have given the preference as a winter grass. I made allusion to these experiments in the October number of the Southern Agriculturist of 1834, page 520, of which I was the temporary Editor, during the absence of

the friend who so ably conducted it. Recently, a distinguished Agriculturist in Europe, sent to me for some of the far-famed Muskeet grass, from Texas, of which I had heard a favorable notice from some of my friends, but had overlooked the printed accounts. The seeds were accordingly obtained from Columbia, I hesitated in sending them immediately, inasmuch as I suspected in them an old and familiar acquaintance, which, on being forwarded to Europe, would be like sending "coals to Newcastle." An imperfect specimen of the mature plant, kindly sent by my friend Joseph O'Hear, rendered it quite certain, that I had once more, under a new name, obtained the *Holcus lanatus*, the famous Lewis and Clarke's grass, of Mr. James Nicholson, described by Linnæus, Curtis, Schreber, Knapp, and a whole host of European Botanists, — a native of the woods and fields of Europe, experimented on by agriculturists, and supposed less valuable than many other grasses in cultivation; introduced into New England by our pilgrim forefathers, and carried by migratory birds to the far West, and all over the land. Here now are seeds of a grass that have passed through the hands of the most intelligent, patriotic, and purest men of the State, liberally and generously disseminated over the country, and yet sad mistakes have originated from a want of Botanical knowledge. The grass, I trust, may yet prove as beneficial to the State as the most sanguine could desire. That which is unsuited to one soil and climate, may be admirably adapted to another. But had those who imported and disseminated the seed, possessed a small share of scientific knowledge, they might have been instructed by the experiments made on it, for a century past in Europe, and America, and obtained it far short of Texas, even in many of their own fields and gardens.

2 The advantages of the study of systematic Botany, may be farther seen in removing the evils which result from the use of the common names given to plants, which are not uniform, even in different neighborhoods of the same State. How many species of plants are there, that are called Snake-root, by the people of the country, which are indiscriminately applied to the cure of diseases, although their characters and medicinal properties differ very widely, some being cathartics, some emetics, and others tonics. Various species of the three very distinct genera of *Gentiana*,

Aristolochia and *Asarum*, are called by this unmeaning name. But more especially do we find this confusion, existing in the common names given to Grasses; I will illustrate this by a familiar instance. The farmer of New-York possesses an invaluable grass called the Timothy grass, named, it is supposed, after the man who is said to have first introduced it into cultivation. But he has heard of other fine grasses on which he is also desirous of making an experiment. He sends to England for the Meadow Cats-tail, the finest grass in Europe; and to Maryland or New-England, for the far-famed Herd's-grass. When these seeds have been received, after much expense and trouble, he will discover that these are but different names for the Timothy grass, he already possesses, and that he could have acquired the specific name of *Phleum pratense*, by which it is known among Botanists all over the world, much easier than he has learnt the various vulgar names by which such confusion has been created.

8. Another department in Natural History, which ought not to be altogether overlooked in an Agricultural School, notwithstanding it is regarded as a study wholly unconnected with Agriculture, is *Ornithology*. Nature has wisely provided that one race of animals should serve as a check upon the too rapid increase of others. This uniformity is seen in every department of her works. The bird is a blessing to the husbandman by destroying the reptiles and insects, which would otherwise be an annoyance to him, and by ridding the earth of a superabundance of the seeds of weeds and grasses. The Stork in Holland, the Turkey Vulture in Carolina, and the Rooks of England, are familiar instances, where man has acknowledged the benefits derived from some of their species; and indeed the boxes provided for the Purple Martin, and the calabashes for the house Wren, all go to testify that the farmer is not wholly unmindful of the benefits he derives from some of the feathered race. I would we could say this of many other species, that have been either neglected or misrepresented. So ignorant are our culturists of Ornithology, that they know not what birds should be destroyed as nuisances, or preserved as benefactors. Old Kalm tells us a story that will bear frequent repetition; that in Virginia, in his day, a bounty was given for the destruction of the little Crow, meaning, no doubt, some species of what are usually

called Black birds, of which there is a considerable number of different Genera and habits, a few doing some injury to the corn, but the great majority, the Cow bird, (*Leterus pecoris*), especially, being decidedly beneficial to the farmer ; but they were destroyed, (of how many species there was no Ornithologist to tell,) and the consequence was that such was the increase of destructive insects, that they, after a great expenditure of money, would have bought back the murdered birds at any price. In the days of our forefathers, a Governor of New-England offered three-pence a head for the Purple grackle ; but it is said the insects multiplied so rapidly, that the herbage was destroyed, and the inhabitants were obliged to import hay from Pennsylvania and England. In fact, a single bird of this species, by destroying the grubs that feed on the young corn, saves more corn than would feed an hundred Grackles for a whole year. Even our Hawks, against which the world has declared an exterminating war, do not deserve to be indiscriminately denounced, inasmuch, as a considerable number of the species are not only harmless, but beneficial to us. Four species that visit Carolina, feed on insects—one on fish, one on serpents, and one on frogs and lizzards. “I have made a good day's work said a planter to me, for after watching and crawling nearly all day, I have shot these two Hawks, which is as good as a dozen fowls saved.” I thought he looked a little disconcerted, when I informed him that he had killed a pair of his best friends, the Mississippi Kite, a species which feeds alone on insects, and is so little carnivorous, that it would not even pounce on a sparrow. Some of our Owls, feed exclusively on mice, others on small birds ; and, of all our Southern species, the great horned, or Virginia owl, is the only one which is injurious to our poultry, and this is exceedingly rare, We have two species of Crow on our sea-board, one of which, and the rarest, is principally injurious to corn ; the other, feeding on worms, berries and fish, is comparatively harmless, yet they are seldom known as distinct, by the farmer, who denounces vengeance indiscriminately against friend and foe.*

* In the State of New-York, the following plan has been successfully adopted for thirty years, in preventing the crows from pulling up the newly planted Indian corn. Boiling water is first poured on the seed corn, in sufficient quantities to fill the vessel in which it is placed. When the water has stood on a few hours, to become perfectly cool, it is poured off and half a pint of boiling coal tar to every bushel of corn is poured on the seed, which is carefully stirred, until every grain is covered

We have in Carolina, about 250 of the 500 species of American birds, found North of Mexico, the majority of which are migratory; but a large minority either remain with us some time during spring and summer, or are permanent residents; of all this number, we have only about a dozen species, that can, by any possibility, be regarded as decidedly injurious to the planter. All our Thrushes and Orioles, our Fly Catchers and Warblers, are useful aids in destroying worms and insects. The tyrant Fly catcher, or Bee bird, is destroyed by our American youths, (who appear to have the organ of destructiveness largely developed) because he is said to kill bees. It is true he may kill the bee that falls in his way, but he makes amends by destroying thousands of noxious insects; and is, moreover, a great protection to the poultry yard, for he never suffers a Hawk to come within a quarter of a mile of his nest—makes war against the Crow and Vulture, and even pounces on the back of the Eagle, the emblem of our pride and glory. The whole tribe of Warblers feed on caterpillars and worms, each individual consuming several hundreds in a day. During the last spring, I had a large bed of cabbages and cauliflowers, which were so infested by the small green cabbage worm, that their leaves were perforated like a honey-comb, and I was obliged to have the worms picked every morning, amounting often to a tea-cup-full. About this time, I observed a nest of the orchard Oriole, in a garden adjacent to mine; the old birds found their way into my cabbage yard, and so thoroughly kept down the worms for three weeks, that they proved better scavengers than my servants, and saved us further labor during that time. But the nest was discovered by the little lads of the neighborhood, who seized on the young, and caught

with a thin coating of tar. It is then rolled in Gypsum, which is used as a valuable manure, but is of no particular use in keeping off the crows. The hot water does not affect the vitality of the grain, on the contrary, it hastens its germinative powers. When this plan was first adopted in the Northern States, on a few of the farms, it did not immediately answer the expectations of the farmer, inasmuch, as the fields were visited by a succession of crows, and the new comers were all obliged to submit to a tarred mouth, before they could be induced to desist, and their thievish propensities were encouraged by other fields of untarred corn. But since the practice has become universal, the crow-minder has been found to be superfluous. A few of our Carolina planters, have within the last few years, adopted this plan, adding saltpetre to the hot water, omitting, I regret to say, the Gypsum, and they speak favorably of it. I have no doubt, were it to become general, it would be equally efficacious.

the old in a trap cage, and now the cabbage worm re-appeared, and remained a pest during the whole summer. The countless millions of Sparrows that visit us in winter, merit our protection and gratitude, on account of their devouring the seeds of weeds and grasses, that would, otherwise, overrun our fields; and I even doubt, whether our Rice-bird, whose delicious flesh should disarm our hatred against it, on account of the depredations it commits on our late crops of rice, does not, in another particular, make amends for its hasty autumnal meal, by its return to the same fields on the following spring, in its harlequin dress, to pick up the scattered grains of rice left on the ground, and thus saves in part at least, the labor of picking out the stems of volunteer or red rice.

9. *Entomology.* This important study must yet be pressed into the service of the culturist, and can only be pursued with advantage by men instructed in the schools of science. Until we know the characters of insects, their modes of propagation, and peculiar habits, we can never find a remedy, against their depredations. A proper knowledge of Entomology will save us much useless labor, and be productive of incalculable advantage. Although this science was not regarded in Europe as of great importance to agriculture, until within the last twenty years; yet, such successful results have been produced, that the farmer now regards the Entomologist with respect, and welcomes him as a benefactor. As far as I have been able to ascertain, there is not a single insect in that country, whose depredations were formerly dreaded, that has not either been compelled by the power of science, to pause in its career of mischief, or been exterminated from the farms. It must, however, be recollected, that we are living in another hemisphere, which, as far as Natural History is concerned, is emphatically a new world. There is not a solitary species of native quadruped, land bird, plant or insect in Carolina, that is identical with any species in the old world. Their science can, therefore, only aid us in the manner in which our experiments must be conducted. It is left to us to study the species, and discover the remedies. The pecuniary losses which are sustained by insects in a single year, in two of our staples alone, wheat and cotton, would be sufficient permanently, to endow an Agricultural School in every State and Territory of the Union. There is no greater mystery in the insects that lie imbedded at the joints of the wheat stalk, or that perforate the bolls of cotton, than there is in many

better known species, whose habits have been determined, and whose depredations have been effectually checked. We should also recollect, that situated as we are, so near the tropics, where insects so abundantly abound, we are constantly liable to fresh importations of foreign species, that may become permanent residents, if we are not timely guarded against them. Within the last five or six years, a minute insect has appeared on the stems of our Fig-trees, which, if left unmolested, destroys the largest tree in a single season, and at one time threatened the destruction of these, the most valuable fruit trees on our Southern sea-board. Its character, however, has been investigated, and we are induced to hope a remedy, which is now in the course of experiment, has been discovered. On the Orange trees of Carolina, an insect, which, when removed from its envelop, is no larger than a pins point, made its appearance some twelve or fifteen years ago. How it was brought here, or from whence it came, no one can tell, as it appears not to have been described. The evil might have been checked in the bud, but the insidious foe was too insignificant in size to create apprehension, and in a few years, our beautiful orange groves presented the appearance of a forest through which the fires had passed. A severe frost succeeded, and relieved us of the unseemly sight, by destroying effectually the few trees in which there still existed the lingering remains of life. Unfortunately, the same pest (not the less formidable on account of its minute size,) has very recently been introduced into the Orange groves around St. Augustine. If the fires of heaven had blasted every tree and herb, and consumed every dwelling and out-house in those regions of East Florida, where the orange is an article of commerce, the injury the inhabitants would have sustained would have been an hundred fold less than they are now doomed to experience from this insect. I perceive by the fruits obtained this season from Cuba, that this enemy has also found its way into that beautiful Island, and unless the neglected, and despised science of Entomolgy, comes forth to the rescue, we may, a few years hence, look in vain for an Orange, Citron, Lemon, or Lime, from Florida or Cuba. If the facts I have stated, are not yet sufficient to convince the agriculturist of the evils which arise from the neglect of this study, I will add a few others that have fallen under my personal observation.

About thirty-five years ago, in my native State of New-York, a large spiny caterpillar appeared on the Lombardy poplar trees, the only shade trees then existing in our Northern villages. Men became alarmed, for it was reported, that a dog had been stung and died, rumor soon magnified it into a child, that had been killed, in another part of the State. The press issued many strange conjectures and crude speculations. Consultations were held by the fathers of the land on this new danger, from a recently imported, and dreadfully poisonous scorpion, as it was supposed to be. It was urged in vain, that the so much dreaded insect, was only the larva of a gaudy and well known species of Butterfly, (*Papilio antiope*) and that it would be an act of vandalism, to destroy the beautiful shade trees, for harboring a harmless caterpillar. But the science of Entomology, which had scarcely been heard of, could not stem the torrent of prejudice and ignorance, and it was resolved, that the trees should be cut down forthwith; the axe was soon at work, and in the course of three weeks, the stately poplars in many of the villages, and along the public highways of New-York, as well as in many towns in New-England, were felled and burnt. I am glad that their posterity have grown wiser, and re-planted them.

A farmer on Charleston Neck, two years ago, solicited my advice in regard to the Tomato worm, which in spite of the most careful attention on his part, had so increased during the season, that his large crop of Tomatoes, on which he principally depended for the markets, was in danger of being wholly destroyed. "I pick them carefully (said he,) with my own hands every morning, and bury them—I am sure, that at least, none of the large ones escape, yet the more I destroy, the more they multiply." I carried him to his little grave-yard, where he had buried his worms, showed him a quart of the remains of his enemies, which had already been transformed into a chrysalis state, assured him, that those which had attained nearly their full size, would have buried themselves in the ground, if he had not saved them the trouble, that to use a vulgar phrase, he had carried the "Rabbit to the briar-bush," that this chrysalis would soon become a moth, (*Sphinx carolinus*) and in its crepuscular flight, would, by depositing its numerous eggs on the leaf of the Tomatoe, lay the foundation of ten thousand more of his formidable opponents.

There was a faint smile of incredulity on his countenance, and thus we parted.

A few weeks ago, I observed in the district of Lexington, near the borders of Edgefield, an extent of country, fifteen miles in diameter, where nearly all the Long-leaved pines had been killed by a worm, usually called Sawyer or borer—producing, as they supposed, (no doubt correctly,) disease and mortality among the inhabitants, from the decay of vegetable matter, and the exposure of the unshaded earth to the rays of the sun. The ravages of this destructive insect, have been occasionally observed, for many years past, in particular localities, between Florida and North-Carolina. Many of the inhabitants, were at a loss to account, for the cause of this destruction of their finest timber. Some supposing it to have been occasioned by the heavy rains, of the last season, which they thought might have caused the roots of the trees to perish. The pileated Woodpeckers, were by hundreds, busy in extracting the marauders from the bark, in the various stages of the larva, chrysalis, and the beautiful perfect, coleopterous Insect, and the lads were shooting them in all directions, as many of them believed, from the tens of thousands of perforations in the bark, that these useful birds were destroying their trees.

How frequently have we seen in our maritime districts, vast labor expended by the lovers of fine fruit, in placing layers of oyster shells or a pavement of bricks, around the roots of our Peach trees, in order to guard the fruit from the depredations of that pest, the Peach curculio. A little knowledge of Entomology would have convinced them, that the Insect, as it drops from, or with the fruit, buries itself in the earth, often at a considerable distance from the roots, where it undergoes its transformations, and in the spring, crawls up the tree to renew its depredations, and that all their labor and expense, is perfectly useless as a preventative, and positively injurious to the growth of the tree. How few farmers are there, who can be convinced, than the worm (*Egeria exitiosa*) which causes the gummy exudation from the stem, is in no wise connected with the destroyer of the fruit, and belongs to an entirely different family of Insects. The cause of the slabbering of horses, that feed on the young growth of clover, in the Middle States during summer, rendering the animals poor, and the pastures almost useless, has occasioned infinite contradictory, and some very absurd conjec-

tures ; and even now, it has not been satisfactorily determined, whether the evil was occasioned by a poisonous weed, or an Insect, or whether it was to be traced to the clover itself. The same difficulties exist in regard to what is called the milk sickness in Alabama and Mississippi, where thousands of cattle annually fall victims to this disease, and from which we are told, even man himself, is not exempt.

But it may be asked, can science find a remedy against the depredation of Insects ? I answer, this has already been done in a large number of cases, in our own country, even with our limited knowledge of the subject, possessing as we do, scarcely a dozen Entomologists, to seventeen millions of inhabitants ; and man will prove himself unequal to his high destination, if he does not triumph over every opposing difficulty. The God of Nature has appointed him Lord over this lower creation. In obedience to his laws, he has conquered the Lion, the Tiger, and the Bear, subdued the native ferocity of the Elephant, and rendered him obedient to his will, and subservient to his use—he has measured the very heavens, and is now beginning to traverse the earth with the speed of the bird, and surely he will not suffer himself to be discomfited by an Insect.

In conclusion, whilst I sincerely hope the contemplated Survey may, by the judicious selection of the individual, to whom the work is entrusted, and by the forbearance, indulgence, and cheerful aid of our enlightened planters, be productive of much benefit to our agricultural interests, I cannot refrain from expressing the desire and belief, that, in due time, we may hear of efficient Agricultural Societies, Agricultural Publications, and an Agricultural School.

The melancholy facts are undoubted, that whilst all our Northern States have advanced in agricultural improvements, South-Carolina has deteriorated. Notwithstanding our mild climate, capable of producing two crops a year—the number of products to which our soil is adapted—the fine streams for mill-seats and manufactories with which our State abounds, and the facilities to a market afforded by our navigable rivers and rail-roads ; the increase in our exports is confined to cotton and rice alone, and of the latter, we do not export a much larger quantity than we did half a century ago. Formerly, we exported grains, we are now importing from

other States, the materials that serve as food for ourselves and our cattle. In other years, the boats from Camden and Columbia brought corn and oats to Charleston, now these boats are employed in conveying these important and necessary articles of food, as well as hay from our city (where they have been received from the States North of us) to Columbia and Camden. I have some where read a statement made by Mr. Seabrook, the accuracy of which cannot be questioned, that during the last twelve years, South-Carolina had, on an average, imported 350,000 bushels of corn annually. How greatly would this list of our imports be swelled, were we to add to the above the oats, hay, flour, butter, beef, pork, lard, and other articles of food, which might be produced in our own State. Under such wasteful drains on the pecuniary resources of the State—with so many enemies preying on the vitals of her prosperity—under a system of husbandry that is yearly rendering her soil more sterile—confining herself to the culture of cotton, which has greatly fallen in price, and of which more is grown than the world can consume—with rivals in Egypt, India, and Brazil, whilst the South-Western States and Texas, can produce the article at a cheaper rate—how long will it be before South-Carolina will become wholly impoverished?

I have alluded to these humiliating facts, not from any desire of indulging a spirit of disaffection or censoriousness, but with deep and unmingled regret, that the State of my early choice; whose institutions I love; with whose prosperity my best interests are associated, and for which my most fervent aspirations ascend, should, by a neglect of her agricultural interests, have permitted her neighboring States, possessing fewer natural resources, to outstrip her in the race of improvement, and in that agricultural knowledge, on which our prosperity and power so manifestly depend.

There is a consolation, however, in the belief, that our people are learning a salutary lesson from adversity. The resuscitation of a soil, rendered sterile by improper modes of cultivation, it has now been ascertained, can be easily effected by patience, judgment and a small share of industry. Great-Britain had once an unproductive soil, which by scientific culture, has become the Garden of the World. I well recollect, when the farms of the State of New-York, were cultivated in the mode which has so long and so ruinously been adopted in Carolina. Successive crops of wheat were

sown on the same field. In four or five years, the lands were exhausted, and scarcely produced six bushels to the acre—they were then thrown out as old fields; the trees in the neighboring woods were deadened—the under-brush burnt—the new lands cultivated in the same slovenly way, till they, in their turn, became unproductive, and the farmers went to seek for richer lands in the western counties. Now, these old and once abandoned fields, have by a judicious mode of culture, by a rotation of crops, by the use of clover, plaster, lime, and other manures, been rendered more productive than when the lands were originally cleared, and yield on an average, from twenty-five to thirty bushels of wheat, or eighty bushels of corn to the acre. In Carolina too, it has been ascertained, that although we cannot raise such large crops of corn as are produced in the Northern States, we can at least, treble the product of former years. The results of the several experiments recorded in the *Southern Agriculturist*, are sufficient evidences of this fact. Mr. O'Hear, during the last season, raised forty-six bushels, Mr. Coward, fifty-two and three quarters, a writer under the signature of Z., fifty-seven and a half bushels, and Mr. B. R. Smith, sixty-seven bushels and eighteen quarts, to the acre.

Within the last few years, I have observed a spirit of inquiry and increased knowledge among our young planters—I can enumerate at least twenty, in the limited list of my acquaintance, who by judicious and scientific modes of culture, have doubled the products of their fields. If the schoolmaster is at work, let us hail him as a benefactor, and send him scholars. If there is a spirit of inquiry, let us give it a right direction. If South-Carolina ever recovers her proud pre-eminence among her sister States, it will be through the means of Agricultural knowledge. When this is effected, she may hope to win back her sons, who have not already permanently established their families, or found graves in the far West. Our impoverished soils will be renovated—our people will be contented with their natives homes, and the future destiny of our State will fulfil the glowing anticipations of those who found it a wilderness, rescued it from the savage, defended it against a foreign foe, and left it as a rich legacy to their descendants.

1851

1852

Mr. Buchanan

AN INQUIRY
INTO THE
NATURE AND BENEFITS
OF AN
AGRICULTURAL SURVEY
OF THE
STATE OF SOUTH-CAROLINA.

BY
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JOHN BACHMAN.

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